



US006124458A

United States Patent [19]

Müellen et al.

[11] **Patent Number:** **6,124,458**[45] **Date of Patent:** **Sep. 26, 2000**[54] **SUBSTITUTED QUATERRYLENE
TETRACARBOXYLIC ACID DIIMIDES**[75] Inventors: **Klaus Müellen; Heribert Quante**, both
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Berlin, Munich, both of Germany[21] Appl. No.: **09/335,535**[22] Filed: **Jun. 18, 1999****Related U.S. Application Data**[62] Division of application No. 08/860,928, filed as application
No. PCT/EP90/00118, Jul. 21, 1997, Pat. No. 5,986,099.[30] **Foreign Application Priority Data**

Jan. 20, 1995 [DE] Germany 195 01 576

[51] **Int. Cl.⁷** **C07D 221/18**[52] **U.S. Cl.** **546/38**[58] **Field of Search** 546/38[56] **References Cited****U.S. PATENT DOCUMENTS**

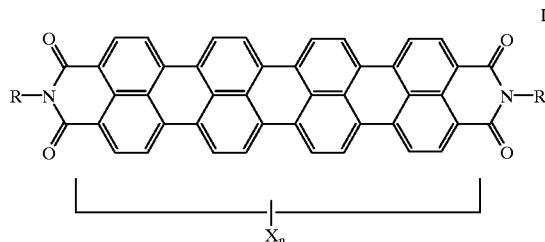
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4, Jan. 1, 1989, pp. 303-317, XP000084462.*Primary Examiner*—Zinna Northington Davis*Assistant Examiner*—Binita Robinson*Attorney, Agent, or Firm*—Oblon, Spivak, McClelland,
Maier & Neustadt, P.C.[57] **ABSTRACT**

Quaterrylenetetracarboxylic diimides I



where

R is hydrogen;

C₁-C₃₀-alkyl whose carbon chain may be interrupted
by one or more of —O—, —S—, —NR¹—, —CO—
and/or —SO₂— and which may be monosubstituted
or polysubstituted by cyano, C₁-C₆-alkoxy or a 5-,
6- or 7-membered heterocyclic radical which is
attached via a nitrogen atom and which may contain
further heteroatoms and may be aromatic, whereR¹ is hydrogen or C₁-C₆-alkyl;C₅-C₈-cycloalkyl whose carbon skeleton may be
interrupted by one or more of —O—, —S—
and/or —NR¹—;aryl or hetaryl, which may each be monosubstituted
or poly-substituted by C₁-C₁₈-alkyl, C₁-C₆-
alkoxy, cyano, —CONHR², —NHCOR² and/or
aryl- or hetaryl-azo, which may each be substi-
tuted by C₁-C₁₀-alkyl, C₁-C₆-alkoxy or cyano,
whereR² is hydrogen; C₁-C₁₈-alkyl; aryl or hetaryl,
which may each be substituted by C₁-C₆-alkyl,
C₁-C₆-alkoxy, halogen or cyano;X is halogen; C₁-C₁₈-alkyl; aryloxy, arylthio, hetaryloxy
or hetarylthio, which may each be substituted by
C₁-C₄-alkyl or C₁-C₄-alkoxy;

n is from 2 to 12,

their preparation and use as pigments or fluorescent dyes and
also substituted 9-haloperylene-3,4-dicarbimides III as inter-
mediates therefor.**1 Claim, No Drawings**